CLAIMS:

1. A thermal processing apparatus comprising:

a heating assembly adapted to support a wafer for processing;

a cooling assembly located such that a thermal conductance region is provided between said heating assembly and said cooling assembly; and

a device configured to adjust a thermal conductance of said thermal conductance region.

2. The apparatus according to Claim 1, wherein said heating assembly comprises a heating body and an electrical resistive element attached to said heating body.

3. The apparatus according to Claim 1, wherein said cooling assembly comprises a cooling body, a fluid path within said cooling body, and a feed device configured to feed cooling fluid along said fluid path.

4. The apparatus according to Claim 1, wherein said device comprises a body having a recess configured to define at least a portion of a chamber configured to receive a working fluid, and a fluid injection system configured to inject a working fluid within said chamber.

5. The apparatus according to Claim 4, wherein said device further comprises a control system configured to control said fluid injection system to achieve at least one of a predetermined density and a predetermined pressure of working fluid within said chamber.

6. The apparatus according to Claim 5, wherein said device includes a pressure regulator, said control system being configured to control said pressure regulator.

7. The apparatus according to Claim 4, wherein said injection system includes a gas supply configured to inject helium gas within said chamber as the working fluid.

8. The apparatus according to Claim 7, wherein said injection system includes an additional gas supply configured to inject a second gas within said chamber as the working fluid.

9. The apparatus according to Claim 4, wherein said device further comprises a vacuum pump configured to evacuate said chamber.

10. The apparatus according to Claim 4, wherein said recess has an aperture, said aperture abutting said heating assembly to define said chamber.

11. The apparatus according to Claim 4, wherein said recess has a platinum coating.

12. The apparatus according to Claim 4, wherein said recess has a membrane therein defining separate sections within said chamber.

13. The apparatus according to Claim 12, wherein said membrane is in a form of a honeycomb.

14. The apparatus according to Claim 12, wherein said membrane is in a form of ribs.

15. The apparatus according to Claim 4, wherein said recess has a side wall and a base, said side wall abutting said heating assembly such that said heating assembly, said side wall, and said base define said chamber, said base being spaced apart from said heating assembly by a gap distance, said base being configured such that the gap distance varies over said base.

16. The apparatus according to Claim 1, wherein:

said heating assembly comprises a heating body and an electrical resistive element attached to said heating body;

said cooling assembly comprises a cooling body, a fluid path within said cooling body, and a feed device configured to feed cooling fluid along said fluid path;

said device comprises a body having a recess configured to define at least a portion of a chamber configured to receive a working fluid, and a fluid injection system configured to inject a working fluid within said chamber; and

said heating assembly and said cooling assembly are mounted on a pedestal, said pedestal having a first conduit extending therethrough and configured to receive power supply wires for said electrical resistive element, said pedestal having a second conduit extending therethrough and configured to act as a supply line for said fluid path, said pedestal having a third conduit extending therethrough and configured to act as a discharge line for said fluid path, said pedestal having a fourth conduit extending therethrough and configured to act as a feed line for said chamber.

17. The apparatus according to Claim 16, wherein:

said recess has a membrane therein defining separate sections within said chamber; and

said fourth conduit is subdivided to provide a separate working fluid within each of said separate sections of said chamber.

18. The apparatus according to Claim 1, wherein at least one of said heating assembly and said cooling assembly comprises at least one of quartz, alumina, sapphire, aluminum, carbon, silicon carbide, and silicon nitride.

19. The apparatus according to Claim 1, wherein said heating assembly comprises aluminum.

20. A thermal processing apparatus comprising:

a heating assembly adapted to support a wafer for processing;

a cooling assembly located such that a thermal conductance region is provided between said heating assembly and said cooling assembly; and

means for adjusting a thermal conductance of said thermal conductance region.

21. The apparatus according to Claim 20, wherein said means for adjusting the thermal conductance of said thermal conductance region comprises a body having a recess configured to define at least a portion of a chamber configured to receive a working fluid, and means for adjusting at least one of a pressure and a density of working fluid present within said chamber.

22. The apparatus according to Claim 20, wherein at least one of said heating assembly and said cooling assembly comprises at least one of quartz, alumina, sapphire, aluminum, carbon, silicon carbide, and silicon nitride.

23. The apparatus according to Claim 20, wherein said heating assembly comprises aluminum.

24. A thermal processing apparatus comprising:

a cooling assembly adapted to support a wafer for processing;

a heating assembly located such that a thermal conductance region is provided between said heating assembly and said cooling assembly; and

a device configured to adjust a thermal conductance of said thermal conductance region.

25. The apparatus according to Claim 24, wherein said device comprises a body having a recess configured to define at least a portion of a chamber configured to receive a working fluid, and a fluid injection system configured to inject a working fluid within said chamber.

26. The apparatus according to Claim 24, wherein said device comprises a driving device configured to adjust a distance between said heating assembly and said cooling assembly.

27. The apparatus according to Claim 24, wherein at least one of said heating assembly and said cooling assembly comprises at least one of quartz, alumina, sapphire, aluminum, carbon, silicon carbide, and silicon nitride.

28. The apparatus according to Claim 24, wherein said heating assembly comprises aluminum.

29. A thermal processing apparatus comprising:

a cooling assembly adapted to support a wafer for processing;

a heating assembly located such that a thermal conductance region is provided between said heating assembly and said cooling assembly; and

means for adjusting a thermal conductance of said thermal conductance region.

30. The apparatus according to Claim 29, wherein said means for adjusting the thermal conductance of said thermal conductance region comprises a body having a recess configured to define at least a portion of a chamber configured to receive a working fluid, and means for adjusting at least one of a pressure and a density of working fluid present within said chamber.

31. The apparatus according to Claim 29, wherein at least one of said heating assembly and said cooling assembly comprises at least one of quartz, alumina, sapphire, aluminum, carbon, silicon carbide, and silicon nitride.

32. The apparatus according to Claim 29, wherein said cooling assembly comprises aluminum.

33. A method for processing a wafer, said method comprising the steps of:

heating the wafer to a predetermined temperature using a heating assembly;

cooling the wafer to the predetermined temperature using a cooling assembly located such that a thermal conductance region is provided between the heating assembly and the cooling assembly; and

adjusting a thermal conductance of the thermal conductance region to aid in heating and cooling of the wafer.

34. The method according to Claim 33, wherein the step of heating the wafer includes utilizing an electrical resistive element attached to a heating body adapted to support the wafer.

35. The method according to Claim 33, wherein the step of cooling the wafer includes feeding a cooling fluid along a fluid path within the cooling assembly.

36. The method according to Claim 33, wherein the step of adjusting the thermal conductance of the thermal conductance region comprises the steps of:

providing a body within the thermal conductance region, the body having a recess configured to define at least a portion of a chamber configured to receive a working fluid; and

adjusting at least one of a pressure and a density of working fluid present within the chamber.

37. The method according to Claim 36, wherein the step of adjusting the pressure or density of working fluid present within the chamber includes the step of evacuating the working fluid from the chamber during the step of heating the wafer and injecting the working fluid within the chamber during the step of cooling the wafer.

38. The method according to Claim 36, wherein the step of adjusting the pressure or density of working fluid present within the chamber includes the step of injecting a first working fluid within the chamber during the step of heating the wafer and injecting a second working fluid within the chamber during the step of cooling the wafer.

39. The method according to Claim 36, wherein the step of providing a body within the thermal conductance region comprises the step of providing a membrane within the recess, the membrane defining separate sections within the chamber.

40. The method according to Claim 39, wherein the step of adjusting a pressure or density of working fluid present within the chamber comprises the step of providing a separate working fluid within each of the separate sections of the chamber.

41. The method according to Claim 36, wherein the step of providing a body within the thermal conductance region comprises providing a body with a recess that has a side wall and a base, the side wall abutting the heating assembly such that the heating assembly, the side wall, and the base define the chamber, the base being spaced apart from the heating assembly by a gap distance, the base being configured such that the gap distance varies over the base.

42. The method according to Claim 33, further comprising providing at least one of said heating assembly and said cooling assembly being constructed from at least one of quartz, alumina, sapphire, aluminum, carbon, silicon carbide, and silicon nitride.